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Abstract

This paper studies the effect of income rank on satisfaction. We hypothesize that a person's satisfaction depend on a comparison of own rank and rank of one's parents. Estimates using data from the German Socio-Economic Panel support the relative rank hypothesis.

JEL Classification: D62, I31

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1 Introduction

A key result of the previous literature on income and reported life satisfaction is the relevance of income comparisons. People appear to care not only for absolute but also for relative income, usually defined in terms of distance to a reference income level (Clark and Oswald, 1996; McBride, 2001; Easterlin, 2001; Ferrer-i-Carbonell, 2005; Luttmer, 2005; Dynan and Ravina, 2007; Clark et al., 2008).

A more recent literature has begun to investigate the role of income as a provider of status whereby individuals derive utility from their rank in a comparison distribution (Brown et al., 2008; Clark et al., 2009). Psychological justifications for such status effects are provided by Paducci's (1968) Range Frequency Theory. As Brown et al. (2008) point out, relative income and income rank, although related, are distinct concerns. For example, if a person's income is 10 percent below mean, then the income rank (percentile) can take any value between 0 and 50 percent even in a simple symmetric distribution, depending among other things on the variance of income.

The objective of this paper is to provide additional evidence on the importance of income rank for satisfaction, using a novel dataset and slightly different methodology than the two papers cited above. First, we analyse the functional relationship between rank and satisfaction, testing whether satisfaction derived from status is linear, convex or concave in status. Second, we take the comparison argument one step further and ask whether utility derived from status is relative as well, such that satisfaction is affected by the difference between own rank and a reference rank.

The relative rank hypothesis is analysed in the context of (adult) children and their parents. We hypothesize that children form status aspirations partly based on their parents' status, and the associated experiences during childhood and adolescence. If so, both own income rank and parental income rank should enter the child's satisfaction equation (with positive and negative sign, respectively).

2 Data

The model is estimated using the 2000-2004 waves of the German Socio-Economic Panel (GSOEP). The GSOEP is a representative annual panel survey of private households in Germany. It collects

information on a wide range of socio-economic and demographic characteristics for all household members. A key strength of this data set is its information on extended families, as the full survey instrument is applied to parent as well as (adult) child households (provided the child household can be located and agrees to participate). In 2000, for example, there were 1,118 parent households that could be matched to at least one adult child household. Excluding children under the age of 20, as well as parents older than 65 or retired, we obtain a sample of 3409 child-year observations for the 2000-2004 period.

For each person and year, we observe income satisfaction (as response to the question "How satisfied are you with your income at present?" given on an eleven-point scale from 0 to 10 where 0 means "completely dissatisfied" and 10 means "completely satisfied"), a health indicator, age, education, gender, employment and marital status, as well as own income. Income is disposable household level income from all sources, including transfers. The rank variable is adjusted for life-cycle effects. We regress household equivalent income on a second-order age polynomial, year and region (west versus east) separately for the parent and for the child sample, and calculate then for each person the percentile rank in the residual distribution. The reference group is thus determined by region and age.

Descriptive statistics for selected variables for parents and children are reported in Table 1. The average income satisfaction, on the 0-10 scale, is around 6 for both children and parents. Average income of parents is about 50 percent higher than that of children. The age difference is 25 years on average. Cohort and life-cycle effects are also reflected in marital rates and education levels: while parents have substantially higher marital rates, their average education level (measured in years of schooling) trails that of their children by half a year. All these differences are statistically significant.

3 Models and Results

A first step clarifies the nature of the relationship between income satisfaction and income rank, conditional on equivalized income. We ran four regressions that differ in the way income rank enters as a regressor: linear, logarithmic, 4th order polynomial, fractional polynomial. Figure

1 shows the predicted profiles. The 4th order polynomial reveals some convexity at the tails. However, the adjusted R-squares for the four models are extremely close to each other (they range from 0.1751 for the logarithmic specification to 0.1756 for the linear). We also estimated a fifth regression model applying a Box-Cox transform to rank, and tested the null hypothesis of a linear specification. The p-value was 0.9. The profile for the Box-Cox regression in Figure 1 is barely distinguishable from the linear regression. The linear specification seems to be a reasonable approximation over much of the range of the regressor, and it will be used in the remaining analyses.

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Figure 1 about here

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The baseline model of income satisfaction with relative status effects is

$$S^c = \beta_0 + \beta_1 r^c + \beta_2 r^p + x'\gamma + u \tag{1}$$

where S is income satisfaction and r income rank. The superscripts 'c' and 'p' indicate whether the variable pertains to children or parents. The vector x includes household income and household size, for both children and parents, as well as further control variables such as age, gender, and health status of children. In this specification, $0.1 \times \beta_1$ is the predicted increase in satisfaction for a one decile increase in own rank, holding parental rank constant. The relative status effect is captured by β_2. For a given own rank, an increase in parental rank by one decile (and thus an accordingly lower relative rank) changes income satisfaction by $0.1 \times \beta_2$. If children compare their own income rank to that of their parents, then $\beta_2 < 0$. Equation (1) was estimated with and without additional controls, using either pooled OLS or the between estimator. The between estimator averages all person specific observations over time and thus uses long-term, or permanent variation in status rather than short-term fluctuations to identify the status effects.

The first two columns of Table 2 show the pooled OLS results, columns (3) and (4) the between estimates. The positive own income effect is large and robust. The point estimates lie between 1.1 and 1.6, depending on specification. All of the estimates are statistically significant. The

evidence regarding relative income and rank is less clear-cut. Although all estimated effects are sizeable, pointing in the same direction across the four models, the between estimates tend to be somewhat smaller and, naturally, measured with less precision. As a consequence, none of them is statistically significant. Based on the pooled OLS results with controls (where standard errors have been adjusted to account for within-person correlation of errors), there is evidence that all of the three comparisons, parental income, own rank and parental rank, have a statistically significant impact on satisfaction, ceteris paribus. Specifically, a positive effect of parental income suggests that a relative income effect, if any, is more than compensated for by other forces, including altruistic or spillover effects (see Brown et al., 2008, for a similar finding). Own rank has a positive effect on satisfaction, holding own income constant. The two point estimates for own log income and own rank are almost the same (1.14 verses 1.13) but their meaning differs, as child log income has a standard deviation of 0.58 whereas the standard deviation of rank is 0.26. Finally and importantly, the estimated coefficient on parental rank is negative, thus supporting the relative status hypothesis.

The absence of a statistically significant parental rank effect in three out of four specifications could reflect non-homogeneity in the underlying mechanisms. Specifically, we followed the arguments of Dynan and Ravine (2007) and explored an asymmetry hypothesis, whereby satisfaction of children with rank lower than that of their parents is affected less by how much their rank differs from their parents' rank, while the satisfaction of children with rank above that of their parents is considerably affected by how much their rank lies above their parents' rank. Formally, we consider the modified regression model

$$S^c = \beta_0 + \beta_1 r^c + \beta_2 r^p + \beta_3 (r^c - r^p)\mathrm{I}(r^c > r^p) + x'\gamma + u \tag{2}$$

where I is the indicator function that is one if $r^c > r^p$ and zero else.

Table 3 display the estimates for the models allowing for asymmetric effects. The results reveal a strong contrast between the effects below and above the comparison norm. The effect of rank, both own and relative, is small and insignificant for children situated lower in the income distribution than their parents. For those whose own rank is higher than the parental rank, the effects are larger and significant. For instance, considering the results from the pooled model with

the full set of controls, a decile improvement in own rank increases income satisfaction by 0.13. Conversely, suppose that two individuals have the same rank but that parents of one of the two are placed a decile higher in the parent income distribution. Income satisfaction of this person with lower relative rank is then predicted to be lower by 0.09. However, both effects materialize only for those whose own rank lies above that of their parents.

It is unlikely that the asymmetry originates from neglected non-linearities between rank and income satisfaction. Our functional form explorations suggested otherwise, as the linear specification emerged as a reasonable approximation. Another argument recognizes that a child's satisfaction can be related to its parents economic status in multiple and possibly complex ways, that would not be present in purely external status comparisons. For example, low ranked children might expect future benefits from their higher ranked parents, diminishing the adverse effect of low relative rank *per se* on income satisfaction. While we cannot rule out such expectation effects, the aforementioned study by Dynan and Ravina (2007) suggests that the asymmetry finding might have wider validity, as they report it for relative income comparisons that are based on average earnings of persons who are similar in terms of education, occupation and state of residence, rather than parents.

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Tables

Table 1: Descriptive statistics of selected variables

	Children		Parents	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Income satisfaction	5.82	2.02	6.07	2.01
Log. household income	7.96	0.54	8.44	0.50
Log. household size	0.59	0.48	0.89	0.37
Age	26.6	4.1	52.0	5.4
Education	12.3	2.2	11.8	2.6
Married	0.27	0.42	0.86	0.34
N	955		1522	

Table 2: Relative income rank and income satisfaction of children

	Pooled OLS		Time averages	
Variable	(1)	(2)	(3)	(4)
Log. household income child	1.415	1.139	1.586	1.179
	(0.249)	(0.358)	(0.332)	(0.555)
Log. household income parent	0.582	0.787	0.333	0.399
	(0.257)	(0.259)	(0.340)	(0.408)
Rank of child	0.963	1.132	0.620	0.892
	(0.390)	(0.541)	(0.485)	(0.792)
Rank of parents	-0.488	-0.986	-0.109	-0.489
	(0.432)	(0.431)	(0.540)	(0.647)
Controls	No	Yes	No	Yes
N	3409	3409	955	955
R squared	0.185	0.235	0.202	0.262

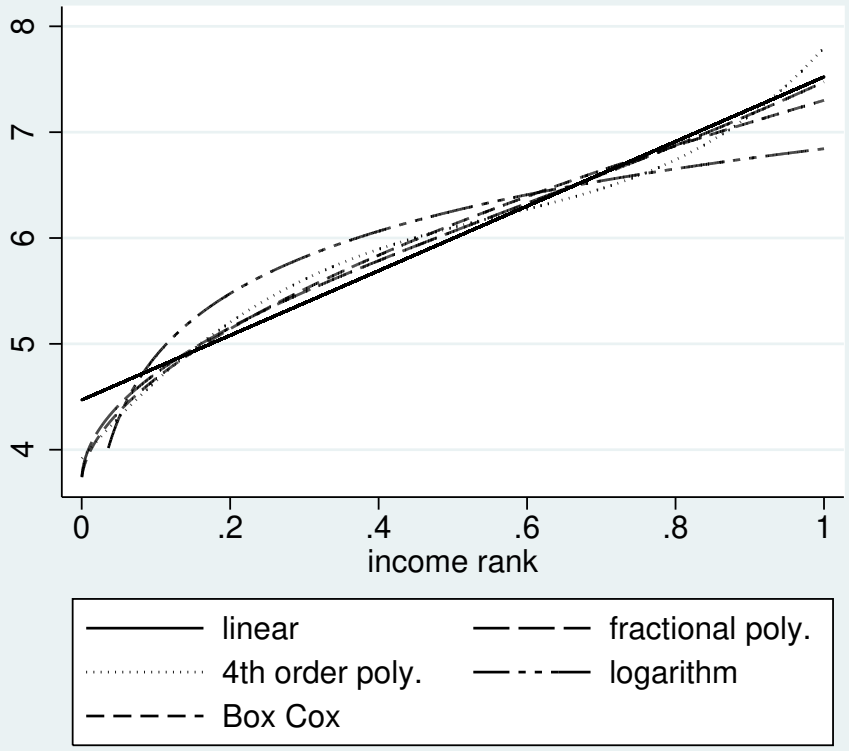
The dependent variable is respondents' *income satisfaction*. Robust standard errors with adjustment for clustering, in parentheses. Controls include household size, health, age, education, gender, employment and marital status, and time fixed effects.

Table 3: Asymmetric relative rank effects

	Pooled OLS		Time averages	
Variable	(1)	(2)	(3)	(4)
Log. household income child	1.485	1.195	1.670	1.230
	(0.250)	(0.363)	(0.333)	(0.572)
Log. household income parent	0.563	0.773	0.289	0.381
	(0.256)	(0.259)	(0.333)	(0.396)
Rank of child	0.396	0.618	-0.061	0.387
	(0.447)	(0.586)	(0.591)	(0.870)
Rank of parents	0.013	-0.513	0.527	-0.002
	(0.481)	(0.474)	(0.622)	(0.701)
Rank difference ×	0.955	0.901	1.148	0.905
child rank higher	(0.386)	(0.364)	(0.535)	(0.523)
Controls	No	Yes	No	Yes
N	3409	3409	955	955
R squared	0.188	0.237	0.207	0.265

The dependent variable is respondents' *income satisfaction*. Robust standard errors in parentheses. Controls include household size, health, age, education, gender, employment and marital status, and time fixed effects.

Figure 1: Income satisfaction and income rank



Source: German Socio–Economic Panel, own calculations